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## ABSTRACT

A cost effectiveness study by the Austin (Texas) Independent School District of its elementary compensatory reading programs, namely, the Chapter 1 Reading Improvement Program (Chapter 1 Regular) and Schoolwide Projects (SWP), found that the Schoolwide Projects cost two to three times as much to achieve the same gains in student achievement as did the Chapter 1 Regular program. Both programs are funded by the Education Consolidation and Improvement Act Chapter 1. Both programs measure improvement in reading skills with the Iowa Test of Basic Skills. The programs differ in the way that instruction is delivered. Chapter 1 students receive supplementary instruction from a reading specialist. SWP students receive all of their instruction in a classroom with students of mixed achievement levels, but where the pupil-teacher ratio has been reduced to 15-to-1. To measure achievement gains, percentiles were converted to Normal Curve Equivalents (NCE) and students' pre-test scores were compared to their post-test scores. Only teachers' salaries were used as the program cost. The cost per student was divided by the average NCE gain to obtain a cost-effectiveness figure that translates into dollars per NCE gain for each program for each year of implementation. A list of references is included. Statistical data are included on four tables. (FMW)

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WHAT PRICE ACHIEVEMENT:  
A COST-EFFECTIVENESS STUDY OF  
CHAPTER 1 AND SCHOOLWIDE PROJECTS

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What Price Achievement:  
A Cost-Effectiveness Study of  
Chapter 1 and Schoolwide Projects

Perspective

Chapter 1 is a federally-funded compensatory education program created as a part of the Department of Education's Education Consolidation and Improvement Act (ECIA) of 1981 (U.S. Department of Education). Called Title I in previous legislation, Chapter 1 serves educationally disadvantaged students who reside in school attendance areas with high concentrations of low-income families. The emphasis of the program is on providing supplemental instruction to boost the achievement of children who demonstrate the most need (i.e., have the lowest test scores).

Chapter 1 participation is based on both economic and academic criteria. Within a district, schools which serve higher concentrations of low-income families than the district average are eligible to receive Chapter 1 funds. Austin (Texas) Independent School District has two kinds of Chapter 1 programs: the Chapter 1 Reading Improvement Program and Schoolwide Projects (SWP's).

For the Chapter 1 Reading Improvement Program (also called Chapter 1 Regular) in AISD, standardized test results are used to determine how many students to serve at each eligible school. Participants are identified by ranking the students at each school and selecting those with the greatest academic need. Only students with reading comprehension scores at or below the 30th percentile on a standardized achievement test are served by Chapter 1 in AISD. During the 1986-87 school year, Chapter 1 paid for reading specialists who provided supplementary reading services to over 4,100 students at 32 elementary schools in AISD. This program is coordinated with the District's basic reading curriculum and provides additional assistance to students who are deficient in oral language and/or reading skills.

When the percentage of low-income families within a school's attendance area exceeds 75%, Chapter 1 regulations allow the local school district to establish a Schoolwide Project (SWP) in which the pupil-teacher ratio (PTR) is lowered to 15-to-1. Chapter 1 contributes funds for teachers based on the number of low achievers and the district must provide matching local funds based on the number of non-Chapter 1 students at the school. These funds are combined and the Chapter 1 program is no longer distinguishable from the regular program because Chapter 1 teachers in a SWP function as regular classroom

teachers with students of mixed achievement levels (and the lower PTR). All students at the SWP's are considered served by Chapter 1.

AISD first instituted its two SWP's in 1980-81. One school became ineligible for Chapter 1 funding when its percentage of low-income families dropped below the 75% level in 1984-85; however, the District opted to carry the entire cost of maintaining the lower PTR at this school. This school continued to function as a SWP, even with an adjusted funding source. Seeking to find a more effective alternative to the "pullout" programs which typify the Chapter 1 Reading Improvement Programs, AISD's program planners and evaluators turned to studies on the effects of class size on student achievement. The meta-analysis conducted by Glass and Smith (1979) suggested that smaller classes facilitate student achievement more effectively. Furthermore, District administrators reasoned, particularly if the PTR could be held down to 15-to-1 or less, many of the problems associated with compensatory instruction (supplanting of regular instruction, disruption, diffusion of responsibility, negative labelling, etc.) could be circumvented or at least reduced (Doss & Holley, 1982).

Comparisons between the achievement gains of students in Chapter 1 Regular and the SWP's are made as a part of the yearly Chapter 1 evaluation in AISD. Two AERA papers which strongly favored SWP's were presented by District evaluators and described the preliminary findings from these comparisons (Doss & Holley, 1982 and Carsrud & Doss, 1983). The gains (as measured by regression analyses) made by SWP students in the first year of implementation were significantly better than the gains made by other Chapter 1 students at all grade levels (Doss, Washington, Moede, & Mulkey, 1981). Partly because SWP's are so expensive (they require matching District funds as well as a large share of the Chapter 1 budget), a longitudinal study of the program has been conducted throughout the 1980's to assess its impact over time.

Despite the first year's substantially higher achievement gains for SWP students, subsequent years have not followed suit. Between 1981-82 and 1986-87, no consistent pattern has emerged to support SWP's over the traditional Chapter 1 program (Christner, Rodgers, Fairchild, & Gutierrez, 1987). Each year only one or two grade levels at the SWP's could be shown to be superior to the comparison group served by Chapter 1 Regular and the grade levels at which this occurred would vary each year. Christner (1987) offers several hypotheses about why the SWP's may have ceased to demonstrate

better achievement gains over other Chapter 1 students which include:

- o Districtwide efforts to improve minority student achievement, and
- o Efforts by the Department of Elementary Education and the Chapter 1 staff to enhance the Chapter 1 Reading Improvement Program through better coordination with the regular reading program.

Christner (1987) also suggests one likely explanation as to why the SWP's failed to produce consistently higher achievement gains: Simply lowering the PTR does not ensure achievement gains (Robinson & Wittebols, 1986). To take advantage of the benefits and opportunities made possible by a lower PTR, teachers must alter the instructional methods that they use with larger classes. SWP teachers were not given additional staff development training on how to alter their teaching and management to reflect the smaller class sizes.

Assuming that some type of compensatory instruction is better than none, the question as to which method of delivering Chapter 1 services is superior remains unanswered. Further complicating the task of making this determination is the realities imposed by economic hardship and fiscal responsibility. This study combines achievement data and cost information for both types of Chapter 1 programs to calculate their cost effectiveness. This is based on the premise that compensatory services must be both academically and economically effective if they are to survive budget cuts, maintain public and professional support, and most importantly, serve the needs of low-achieving children in the most appropriate manner possible.

#### Methodology/Results

The Chapter 1 Reading Improvement Program is compared to the Schoolwide Projects in terms of cost effectiveness for each school year between 1980-81 and 1986-87. The cost-effectiveness analysis procedure employed is an adaptation of the ones established by several other researchers (Gallagher, 1986; Gerritz & Robbins, 1986; Levin, 1983; and Yap, 1985) who conducted similar studies. In each case, varying programs or instructional approaches which had common outcome measures (i.e., achievement score gains) were compared on the basis of relative cost effectiveness. In this study, Chapter

1 Regular and the SWP's both serve low-income, low-achieving children. Both programs attempt to improve the reading skills of these students as measured by the Iowa Test of Basic Skills (ITBS). The programs differ in the way in which compensatory reading instruction is delivered. Chapter 1 students receive supplementary reading instruction from a Chapter 1 reading specialist. SWP students receive all of their instruction in a classroom with students of mixed achievement levels, but where the PTR has been reduced to approximately 15-to-1.

The SWP's were implemented as an alternative to Chapter 1 Regular based on the hypothesis that the reduced PTR would lead to superior gains on achievement tests. Chapter 1 funds were allocated to both programs based on the number of children with pretest scores at or below the 30th percentile (the 40th percentile in 1980-81) on the ITBS Reading Total subtest (Language Total for kindergarteners). Although one SWP school did not receive Chapter 1 funding in 1985-86 or 1986-87, we have included the students from this school because the SWP functioned in the same manner despite its changed funding source (as stated earlier, the District opted to pick up the full cost at this school). Scores at this SWP were analyzed as if Chapter 1 were still providing services for the students. To measure achievement gains for this study, we converted percentiles to Normal Curve Equivalents (NCE's) and compared participants pretest scores with their posttest scores on the spring ITBS tests that were taken at the end of each school year. Students who did not have both a pretest and a posttest score were omitted. NCE gains were calculated by averaging pretest NCE scores and subtracting them from averaged posttest NCE scores. This was obtained for each school year between 1980-81 and 1986-87.

NCE Gains  
Chapter 1 Regular and Schoolwide Projects  
1980-81 Through 1986-87

|         | Chapter 1 Regular | Schoolwide Projects |
|---------|-------------------|---------------------|
| 1980-81 | 1.1               | .9                  |
| 1981-82 | 3.2               | -2.4                |
| 1982-83 | 7.9               | 3.8                 |
| 1983-84 | 6.5               | 1.6                 |
| 1984-85 | 6.0               | 2.9                 |
| 1985-86 | 5.6               | 1.7                 |
| 1986-87 | 3.8               | -1.1                |

Table 1.

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Note: Chapter 1 Regular includes all students served by the Chapter 1 Reading Improvement Program with ITBS pretest scores below the 30th percentile (the 40th percentile in 1980-81) and ITBS posttest scores.

Note: Schoolwide Projects include all students served at the SWP's with ITBS pre- and posttest scores.

Chapter 1 and District allocations for teacher salaries are used as the costs of the Chapter 1 Regular and SWP programs. We limited the cost to salaries because both of the Chapter 1 programs are allotted an equivalent number of teachers (at an approximately equal per teacher cost) as determined by the number of students eligible for Chapter 1 services. At the schools with a Chapter 1 Regular program, the cost is for Chapter 1 reading specialists' salaries. At the SWP's, the cost is for the number of teachers needed to reduce the PTR to approximately 15-to-1. Costs for each program were calculated by dividing the number of students served by the excess amount allocated for teachers' salaries.

Salaries and Students Served  
Chapter 1 Regular and Schoolwide Projects  
1980-81 Through 1986-87

|         | Chapter 1 Regular |               | Schoolwide Projects |               |
|---------|-------------------|---------------|---------------------|---------------|
|         | Cost              | # of Students | Cost                | # of Students |
| 1980-81 | \$1,248,635       | 3,826         | \$307,117           | 1,044         |
| 1981-82 | \$1,333,735       | 3,459         | \$402,210           | 1,019         |
| 1982-83 | \$1,282,322       | 3,172         | \$619,547           | 1,083         |
| 1983-84 | \$1,433,548       | 3,017         | \$424,452           | 1,066         |
| 1984-85 | \$1,493,942       | 4,377         | \$427,593           | 794           |
| 1985-86 | \$2,150,821       | 4,429         | \$617,230           | 1,087         |
| 1986-87 | \$1,797,462       | 3,762         | \$578,167           | 1,077         |

Table 2.

Note: These figures represent expenditures for teachers' salaries only. In the case of SWP's, only the salaries for additional teachers (to lower the PTR) are given.

Note: Both local and federal (Chapter 1) costs are combined. Allocations for both SWP's are also combined.

Cost Per Student  
Chapter 1 Regular and Schoolwide Projects  
1980-81 Through 1986-87

|         | Cost/Student<br>Chapter 1 Regular | Cost/Student<br>Schoolwide Projects |
|---------|-----------------------------------|-------------------------------------|
| 1980-81 | \$326                             | \$294                               |
| 1981-82 | \$386                             | \$395                               |
| 1982-83 | \$404                             | \$572                               |
| 1983-84 | \$475                             | \$398                               |
| 1984-85 | \$341                             | \$539                               |
| 1985-86 | \$486                             | \$568                               |
| 1986-87 | \$478                             | \$537                               |

Table 3.

The cost per student (in terms of teachers' salaries) was divided by the average NCE gain to obtain a cost-effectiveness figure which translates into dollars per NCE gain for each program and in each year of implementation.

Relative Cost-Effectiveness Ratio  
Chapter 1 Regular and Schoolwide Projects  
1980-81 Through 1986-87

|         | Cost/Student/NCE Gain<br>Chapter 1 Regular | Cost/Student/NCE Gain<br>Schoolwide Projects |
|---------|--------------------------------------------|----------------------------------------------|
| 1980-81 | \$296                                      | \$327                                        |
| 1981-82 | \$121                                      | ---                                          |
| 1982-83 | \$ 51                                      | \$151                                        |
| 1983-84 | \$ 73                                      | \$249                                        |
| 1984-85 | \$ 57                                      | \$186                                        |
| 1985-86 | \$ 87                                      | \$334                                        |
| 1986-87 | \$126                                      | ---                                          |

Table 4.

Note: No ratio can be calculated for "negative gains."

Limitations

This study is the first to attempt a cost-effectiveness comparison of compensatory programs in AISD and has

simplified the process considerably. Future studies might match the populations more carefully by comparing Chapter 1 Regular students to only the low-achieving students in SWP's. A cursory investigation of the NCE gains made by Chapter 1-eligible students at the SWP's revealed slightly higher gains than those made by the general population at the same schools. The data could be further disaggregated to determine whether treatment effects differ by ethnicity or gender.

The costs of each program are incomplete because only teachers' salaries were compared. A study which considers expenses for each program's entire budget would be more thorough but would not likely yield substantially different results. In addition, such a breakdown of costs would require apportioning of costs such as building use, program administration, evaluation, textbooks and other materials, computer labs, and additional support staff. Judging appropriate allocations of these features would be difficult, especially in a longitudinal study in which budget records are difficult to obtain and interpret.

### Discussion

The relative cost-effectiveness ratios (see Table 4.) do merit further consideration and discussion. The cost of attaining the same gains for SWP students is much greater (often two or three times greater) than the same NCE gain for students served by Chapter 1 Regular. This echoes the data reported in Christner (1987) which compared similar low-achieving students in Chapter 1 to those served in SWP's. Christner's study found no consistent pattern of gains to the advantage of SWP low achievers over Chapter 1 Regular low achievers.

Why have SWP's been continued even though the evaluation results after the first year revealed less positive effects than the relatively inexpensive Chapter 1 Regular Program? The main reason is the strong belief that having fewer students per teacher is the single best way to improve achievement. This belief is prevalent not only in Austin and AISD, but in other communities as well (Robinson & Wittebols, 1986). For the lower PTR to improve academic achievement, instructional methods and programs must be altered to take advantage of this difference. In the past, AISD did not provide staff development for teachers on how to do this. Experience also shows that once schools receive additional teachers, support staff, a computer lab, or other exceptional features, the staff and concerned community members are

generally unwilling to relinquish these innovations. Even negative or indifferent evaluation results do not influence this preference for supplementary services and programs.

In 1987-88, because of significant changes in AISD's boundaries, 16 elementary schools have high minority enrollment and high numbers of low-income families. The Board of Trustees committed the District to five-year "Plan for Educational Excellence" which is based on effective schools research and will attempt to improve the quality of these campuses (called Priority Schools). To gain the endorsements of administrators, teachers, parents, and community groups, all were involved in the process of selecting resources which would presumably lead to schools of the highest quality. Despite evaluation data indicating Chapter 1 Regular produced at least equal gains (at a lower cost), the one feature that each group most wanted was a lower PTR. Consequently, the District now has 16 SWP's.

AISD has, however, heeded the recommendations that SWP teachers participate in extensive staff development on effective use of the lower PTR. These new SWP's have a number of other differences from the former SWP's: they have more professional support staff, innovative funds for each campus (to spend on extra materials, staff development, etc.), and a strong emphasis on parent and community involvement. Perhaps most importantly, everyone is watching and waiting. Community groups, parents, the School Board, the principals and teachers at other schools, and the taxpayers in general are all watching and waiting to see if these new SWP's or Priority Schools produce justifiable results in terms of student achievement. Evaluations over the next five years will tell.

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